No. 200300115

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Virginia Tech Intellectual Properties, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'McCormick'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this first day of July, in the year two thousand three.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions*

02.050

Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
Virginia Tech Intellectual Properties, Inc.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
VA98W-591

3. VARIETY NAME
McCormick

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
Virginia Tech Intellectual Properties, Inc.
1872 Pratt Dr., Ste. 1625
Blacksburg, VA 24060

5. TELEPHONE *(include area code)*
540/951-9378

6. FAX *(include area code)*
540/951-5292

FOR OFFICIAL USE ONLY

PVPO NUMBER
200300115

FILING DATE
1-30-2003

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
Corporation

8. IF INCORPORATED, GIVE STATE OF INCORPORATION
Virginia

9. DATE OF INCORPORATION
June 20, 1985

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*
Carl A. Griffey
Crop and Soil Environmental Sciences
Virginia Tech
Blacksburg, VA 24061-0404

FEES RECEIVED

FILING AND EXAMINATION FEES:
$ 2705.00
DATE 1-30-2003

CERTIFICATION FEE:
$ 432.00
DATE 6/11/2003

11. TELEPHONE *(Include area code)*
540/231-9789

12. FAX *(Include area code)*
540/231-3431

13. E-MAIL
cgriffey@vt.edu

14. CROP KIND *(Common Name)*
Wheat, Common

15. GENUS AND SPECIES NAME OF CROP
Triticum aestivum

16. FAMILY NAME *(Botanical)*
Triticeae

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☒ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)

a. ☒ Exhibit A. Origin and Breeding History of the Variety
b. ☒ Exhibit B. Statement of Distinctness
c. ☒ Exhibit C. Objective Description of Variety
d. ☐ Exhibit D. Additional Description of the Variety *(Optional)*
e. ☒ Exhibit E. Statement of the Basis of the Owner's Ownership
f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
g. ☒ Filing and Examination Fee ($2,705), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *See Section 83(a) of the Plant Variety Protection Act)*
☒ YES *(If "yes", answer items 20 and 21 below)* ☐ NO *(If "no", go to item 22)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☒ YES ☐ NO
IF YES, WHICH CLASSES? ☒ FOUNDATION ☐ REGISTERED ☒ CERTIFIED

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☐ YES ☒ NO
IF YES, SPECIFY THE NUMBER 1,2,3, *etc.* ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☐ YES ☒ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ☒ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

24. The owners declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER
Michael J. Martin

NAME *(Please print or type)*
Michael J. Martin

CAPACITY OR TITLE
Executive Vice President

DATE
6/2/03

SIGNATURE OF OWNER

NAME *(Please print or type)*

CAPACITY OR TITLE

DATE

S&T-470 (07-01) designed by the Plant Variety Protection Office with WordPerfect 9.0. Replaces STD-470 (04-01) which is obsolete. *(See reverse for instructions and information collection burden statement)*

1

McCormick Wheat

18A. Exhibit A: Origin and Breeding History

McCormick wheat, formerly designated VA98W-591, was derived from the cross VA92-51-39/AL870365. The parentage of VA92-51-39 is IN71761A4-31-5-48// VA71-54-147 (CItr 17449)/ 'McNair 1813'. Wheat line IN71761A4-31-5-48 was developed by Purdue University and has the pedigree 'Benhur'/3/'Arthur'/'Knox' type line with gene H5 for Hessian fly resistance/4/'Beau'*2/3/Arthur*2//'Riley'/ 'Bulgaria 88'. The wheat line AL870365 was derived from the cross 'Coker 747'*2/'Amigo' by the Coker Breeding Program now a part of Sygenta and was selected as a parent from the 1990-91 Uniform Eastern Soft Red Winter Wheat Nursery. The cross was made in spring1992, and the F_1 generation was grown in the field as a single 4ft headrow in 1993 to produce F_2 seed. The population was advanced from the F_2 to F_4 generation using a modified bulk breeding method.

Population Advancement and Selection of the Variety

Wheat spikes were selected from the population in each segregating generation (F_2-F_4) on the basis of absence of obvious disease, early maturity, short straw and desirable head shape and size. Selected spikes were threshed in bulk, and the seed was planted in 225ft^2 blocks in the fall of each year. Spikes selected from the F_4 bulk where threshed individually and planted in separate 4ft headrows. The wheat line VA98W-591 subsequently released as McCormick was derived as a bulk of one of these F_5 headrows selected in 1997. The line was tested as entry 591 in non-replicated observation tests in 1998 and was designated VA98W-591. McCormick was evaluated in preliminary tests conducted in VA, NC, MD, and KY for three years (1999-2001) in the Mason-Dixon Nursery (Tables 4-8). It was tested in 2000 and 2001 under conventional (Tables 1-2) and no-tillage (Table 3) management systems in the Virginia Official Variety Trial. It was evaluated throughout the soft red winter wheat region in the USDA-ARS Uniform Southern and Uniform Eastern Soft Red Winter Wheat Nurseries in 2001 (Tables 9-14).

Multiplication and Purification

Initial Breeder Seed of McCormick was developed in 2000-01 via removal of variant plants from a 6,000 ft^2 seed increase block, and was planted on 1.9 acres at the VCIA Foundation Seed Farm in the fall of 2001. This increase block produced 195 bu of Foundation Seed in 2001, which was planted on 55 acres in fall 2002. While McCormick has remained stable and uniform in composition through the last two generations of multiplication, the initial Breeder Seed contained the following proportion of variants: up to 1% taller plants, 0.1% shorter plants, 1% plants with yellow green color at booting, 0.1% plants with blue color at booting, 0.5% plants having yellow straw near physiological maturity, 0.1% awned spikes, 0.1% strap (blocky) spikes, 0.05% crooked spikes, and 0.05% green waxy spikes.

Development of a purer source of Breeder Seed was initiated in fall 2000. In an isolation block, 280 headrows of McCormick were planted and evaluated for purity and trueness of type from which 136 headrows were harvested individually. Seed from the 136 selected headrows was used to plant individual 115 ft^2 plots in the fall of 2001. Plots were assessed for homogeneity and trueness of type in spring 2002, and 39 variant plots were removed prior to harvest. The remaining 97 plots were harvested in bulk to form a new source of McCormick Breeder seed, which was planted on 10 acres at the VCIA Foundation Seed Farm in fall 2002.

McCormick Wheat

18B. Exhibit B: Novelty Statement

McCormick wheat is uniquely different from all known cultivars. In comparison to other wheat cultivars which it has been tested with, it is most similar to 'Coker 9835' and its sib 'Tribute'. McCormick and Tribute both possess the 1AL/1RS translocation and gene *Pm*17 governing resistance to powdery mildew (*Blumeria graminis*) from 'Amigo', which they inherited from their parent AL870365, while Coker 9835 lacks this translocation and *Pm*17. McCormick possesses gene *Lr*24 governing resistance to leaf rust (*Puccinia triticina*) while Tribute possess genes *Lr*9 and *Lr*24, and Coker 9835 possesses genes *Lr*2a, *Lr*9, and *Lr*11, but lacks *Lr*24. McCormick possesses genes *Sr*6, *Sr17*, and *Sr*24 governing resistance to stem rust (*Puccinia graminis*), while Tribute possesses gene *Sr*24, and Coker 9835 possesses genes *Sr*17 and *Sr*36. Seedlings of McCormick and Tribute are susceptible to Hessian fly [*Mayetiola destructor* (Say)] biotypes GP, B, C, D, E, and L, while those of Coker 9835 are resistant to biotypes GP, C, and E. McCormick is moderately resistant to soilborne mosaic virus while Tribute is moderately susceptible on the basis of reactions (0=Resistant to 9=Susceptible) observed in the USDA-ARS Uniform Southern Soft Red Winter Wheat Nursery in 2001 (McCormick=1.0 versus Tribute=7.0), Uniform Eastern Soft Red Winter Nursery in 2001 (McCormick=1.0 versus Tribute=6.5) and 2002 (McCormick=3.0 versus Tribute=7.5). McCormick produces anthocyanin in its stems, which become reddish purple upon ripening, while Tribute lacks anthocyanin in its stems, which become yellow near physiological maturity.

FORM APPROVED: OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK AND SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*TRITICUM SPP.*)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)

Virginia Tech Intellectual Properties, Inc.

ADDRESS (*Street and No. or R.F.D. No., City, State, and ZIP Code*)

1872 Pratt Drive, Suite 1625
Blacksburg, VA 24060

FOR OFFICIAL USE ONLY

PVPO NUMBER 200300115

VARIETY NAME OR TEMPORARY DESIGNATION

McCormick

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. KIND:

[1] 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:

[2] 1 = SPRING 2 = WINTER 3 = OTHER (*Specify*) _____

[1] 1 = SOFT 2 = HARD 3 = OTHER (*Specify*) _____

[2] 1 = WHITE 2 = RED 3 = OTHER (*Specify*) _____

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

[ ][ ][ ] FIRST FLOWERING [ ][ ][ ] LAST FLOWERING

4. MATURITY (*50% Flowering*):

[ ][2] NO. OF DAYS *EARLIER* THAN .....

[ ][2] NO. OF DAYS *LATER* THAN .....

[7] [8] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS 7=Roane 8=AGS 2000

5. PLANT HEIGHT (*From soil level to top of head*):

[ ][7][9] CM. HIGH

[ ][0] CM. TALLER THAN .....

[ ][6] CM. SHORTER THAN .....

[7] [8] 7=Coker 9835 8=AGS 2000 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING (*See reverse*):

[2] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:

[1] 1 = YELLOW 2 = PURPLE

8. STEM:

[2] Anthocyanin: 1 = ABSENT 2 = PRESENT

[2] Waxy bloom: 1 = ABSENT 2 = PRESENT

[1] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT

[1] Internodes: 1 = HOLLOW 2 = SOLID

[0][4] NO. OF NODES (*Originating from node above ground*)

[ ][ ] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[2] Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

[1] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER (*Specify*): _____

[2] Flag leaf: 1 = NOT TWISTED 2 = TWISTED

[2] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT

[2] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT

[ ][ ] MM. LEAF WIDTH (*First leaf below flag leaf*)

[ ][ ] CM. LEAF LENGTH (*First leaf below flag leaf*):

200300115

11. HEAD:

[3] Density: 1 = LAX 2 = DENSE 3=Mid-dense

[1] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) _____

[3] Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

[2] Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER (Specify): _____

[0][7] CM. LENGTH

[1][3] MM. WIDTH

12. GLUMES AT MATURITY:

[1] Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.)

[2] Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.)

[3] Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

[2] Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

[2] 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

[1] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

[1] Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

[1] Cheek: 1 = ROUNDED 2 = ANGULAR

[1] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

[1] Brush: 1 = NOT COLLARED 2 = COLLARED

[4] Phenol reaction (See instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

[3] Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____

[0][6] MM. LENGTH

[0][3] MM. WIDTH

[3][4] GM. PER 1000 SEEDS

17. SEED CREASE:

[1] Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

[3] Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[2] STEM RUST (Races) Genes Sr6, 17, 24

[2] LEAF RUST (Races) Gene Lr24

[2] STRIPE RUST (Races) Field Tests

[0] LOOSE SMUT

[2] POWDERY MILDEW

[0] BUNT

[2] OTHER (Specify) Soilborne Mosaic Virus

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SAWFLY

[2] APHID (Bydv.)

[0] GREEN BUG

[1] CEREAL LEAF BEETLE

[1] OTHER (Specify) HF Biotype L

HESSIAN FLY RACES: [1] GP [ ] A [1] B [1] C [1] D [1] E [ ] F [ ] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering		Seed size	
Leaf size		Seed shape	
Leaf color		Coleoptile elongation	
Leaf carriage		Seedling pigmentation	

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

McCormick Wheat

18D. Exhibit D: Additional Description of McCormick

Since McCormick has not been tested in comparison with any of the six cultivars listed in Exhibit C, performance data are presented in Tables 1-16. McCormick is a mid-season, high-yielding, short-stature, awnleted, soft red winter wheat with good straw strength. Head emergence is 2 days later than 'AGS 2000' and 2 days earlier than 'Roane'. Average plant height of McCormick (31 inches) is similar to that of 'Coker 9835' and 2 inches shorter than AGS 2000. Straw strength (0=No lodging, 9=Completely lodged) of McCormick is good (range of 0 to 2.6 and mean of 0.9) and is better than that of 'Coker 9663' (range of 1.0 to 4.4 and mean of 2.2). In Virginia (Tables 1-3), grain yields of McCormick have been similar or exceeded those of the best check cultivars and over the past two years (2000-2001) have averaged 83 bu/ac versus a mean yield over all genotypes of 76 bu/ac. Grain of McCormick is high in test weight (mean of 60.5 lb/bu), which is similar to that of Roane (60.2 lb/bu) and 3 lb/bu higher than that of Coker 9835. McCormick was evaluated in the 2001 USDA-ARS Uniform Southern Soft Red Winter Wheat Nursery (Tables 9,10), and ranked 1st among 43 entries for grain yield (77 bu/ac) and ranked 6th for test weight (59.1 lb/bu). McCormick also was evaluated in the 2001 Uniform Eastern Soft Red Winter Wheat Nursery (Tables 12,13), and ranked 1st among 44 entries for grain yield (79 bu/ac) and ranked 5th for test weight (60.1 lb/bu). Based on data from six test sites in the Uniform Eastern SRW Wheat Nurseries (Table 13), winter-survival of McCormick is good and similar to that of 'Caldwell'. Milling quality of McCormick (Tables 11,14) is good and superior to that of Roane and to that of its sib cultivar Tribute (VA98W-593). Grain of McCormick produces more flour than that of Roane and Tribute and its flour is softer in texture than that of Coker 9663 and Tribute. Baking quality of McCormick is good and superior to that of Roane, Coker 9663, and Tribute for cookie production. Flour of McCormick absorbs less water and produces cookies of larger diameter than those of Tribute, Roane and Coker 9663.

Reaction of McCormick to disease and insect pests has been evaluated over a broad area (Tables 1-4, 6, 8, 10, 13, 15, 16). McCormick is resistant to powdery mildew (*Blumeria graminis*). In seedling tests of entries in the 2001 Uniform Eastern and Southern SRW Winter Wheat Nurseries conducted by USDA-ARS Plant Science Research Unit in Raleigh, NC, McCormick expressed resistance to 24 of 30 isolates. McCormick possesses the *Pm*17 gene from Amigo in addition to other non-identified genes. Similar data from the Cereal Disease Laboratory in St. Paul, MN, indicates that McCormick possess gene *Lr*24 conferring resistance to leaf rust (*Puccinia triticina*) and genes *Sr*6, *Sr*17, and *Sr*24 conferring resistance to stem rust (*Puccinia graminis*). The older version of Exhibit C which limits disease reaction classes to resistant or susceptible was submitted with this PVP application; however, on the basis of the classifications in the revised Exhibit C, McCormick exhibits an Intermediate to Resistant reaction to stripe rust (*Puccinia striiformis*), soil borne mosaic virus, leaf blotch (*Septoria tritici*), glume blotch (*Stagonospora nodorum*), fusarium head blight (*Fusarium graminearum*), barley yellow dwarf virus, and wheat spindle streak mosaic virus. On the basis of seedling tests conduct by USDA-ARS at West Lafayette, IN, McCormick is susceptible to Hessian Fly [*Mayetiola destructor* (Say)] biotypes GP, B, C, D, E, and L.

Table 1. Summary of performance of VA98W-591 and VA98W-593 in the Virginia Tech Wheat Test, 2001 harvest.*

Line	Yield (Bu/acre) (7)		Test Weight (Lb/bu) (7)		Date Headed (Mar 31+) (4)		Height (In) (3)		Lodging♥ (0.2-10) (5)		Powdery Mildew (0-9)♠ (4)		Leaf Rust (0-9)♠ (1)	
VA98W-591(RT)	**83**	**+**	**60.0**	**+**	**34**	**+**	**29**	**-**	**2.6**		**0**	**-**	**0**	**-**
VA98W-593(RT)	87	+	60.3	+	33		30		2.8		0	-	0	-
USG 3209(RT)	84	+	57.6		33		28	-	3.3		2	-	1	
PIONEER 26R24(B)	84	+	57.8		33		34	+	3.4		3		2	+
SISSON (RT)	83	+	57.5		31	-	30		4.3	+	2	-	1	
CENTURY II(D)	83	+	58.2		33		31		4.0		4	+	0	-
SS520	83	+	56.9		32	-	33	+	4.0		3		3	+
SS550	83	+	57.5		33		29	-	3.7		2	-	1	
AGS2000	75		57.9		32	-	31		4.6	+	2	-	0	-
PIONEER 26R38(B)	76		57.2		33		34	+	3.9		1	-	1	
PIONEER 26R61(B)	72	-	59.1	+	34	+	33	+	2.0	-	3		0	-
FFR 518(RT)	78		56.6		32	-	30		5.3	+	1	-	0	-
Test Average	77		57.3		33		31		3.1		3		1	
L.S.D. (0.05)	4		1.2		1		2		1.1		1		1	
C.V.	8		3.5		3		5		5.7		43		47	

* A plus or minus sign indicates a performance significantly above or below the test average.

The number in parentheses below column headings indicates the number of locations on which data are based.

♥ Belgian Lodging Scale = Area x Intensity x 0.2. Area = 1-10, where 1 is wheat unaffected and 10 is entire plot affected and Intensity = 1-5, where 1 is wheat standing upright and 5 is wheat totally flat.

♠ The 0-9 ratings indicate relative disease intensity where 0=none and 9=total plant infection.

Table 2. Summary of performance of VA98W-591 in the Virginia Tech Wheat Test, 2000 harvest.*

Brand/Variety	Yield (Bu/A) (7)	Test Weight (Lb) (6)	Date Headed (Mar 31+) (4)	Height (In) (3)	Lodging** (0.2-10) (5)	Powdery Mildew (2)	Leaf Rust (0-9)◊ (2)	Barley Yellow Dwarf (2)
VA98W-591	**82 +**	**59.0+**	**31 +**	**36**	**0.6**	**0**	**1 -**	**2**
VA98W-593	80 +	58.9+	30	37	1.0	0	0 -	2
VA97W-469	74	56.2 -	30	39	1.3	0	4	2
USG 3209	83 +	57.3	27 -	36	1.8+	0	5 +	2
PIONEER 26R24(B)	83 +	57.4+	29 -	40	0.8	0	3	2
SISSON	82 +	57.7+	29 -	36	1.1	0	7 +	2
CENTURY II(D)	79 +	58.2+	29 -	39	1.4	3	3	2
SS 520	79 +	56.8	26 -	40	0.9	1	2	2
SS 550	80 +	57.4+	31 +	37	1.4	0	6 +	2
AGS 2000	81 +	57.8+	28 -	39	1.5	0	0 -	2
PIONEER 26R38(B)	78 +	57.2	29 -	42	0.7	0	4	2
PIONEER 26R61(B)	80 +	59.1+	29 -	41	0.3 -	0	2	2
FFR 518(R)	78 +	56.3 -	25 -	36	2.2+	0	0 -	2
Test Average (n=71)	75	56.9	30	38	1.0	1	3	2
L.S.D. (0.05)	3	0.5	1	—	0.7	1	2	1
C.V.	8	1.5	3	3	102.7	87	49	25

* A plus or minus sign indicates a performance significantly above or below the test average. The number in parentheses below column headings indicates the number of locations on which data are based.

** Belgian Lodging Scale = Area X Intensity X 0.2. Area = 1-10, where 1 is wheat unaffected and 10 is entire plot affected and Intensity=1-5, where 1 is wheat standing upright and 5 is wheat lying totally flat.

◊The 0-9 ratings indicate relative disease intensity where 0=none and 9=total plant infection.

Table 3. Summary of performance of VA98W-591 and VA98W-593 in the Virginia Tech No-till Wheat Test at Warsaw, 2000 and 2001 harvests.*

Line	2-year Average yield (Bu/acre)		1-year Average yield (Bu/acre)		Test Weight (Lb/bu)	Date Headed (Mar 31+)		Height (In)		Powdery Mildew (0-9)♦		Wheat Spindle Streak**
VA98W-591(RT)	**91**		**88**		**60.6**	**37**	**+**	**25**	**-**	**0**	**-**	**R**
VA98W-593(RT)	93	+	97	+	61.1	35	-	27		0	-	R
USG 3209(RT)	93	+	97	+	58.2	36		25	-	0	-	R
PIONEER 26R24(B)	90		90		58.7	37	+	27		2	+	S
SISSON (RT)	97	+	100	+	59.8	33	-	25	-	1		R
CENTURY II(D)	87		88		59.3	37	+	27		2	+	S
SS520	96	+	97	+	58.4	33	-	29	+	0	-	MS
SS550	94	+	94		59.3	35	-	24	-	0	-	R
AGS2000	81		85		58.4	39	+	26	-	0	-	VS
PIONEER 26R38(B)	86		90		59.3	37	+	28	+	0	-	VS
PIONEER 26R61(B)	82		85		59.5	38	+	31	+	3	+	R
FFR 518(RT)	83		90		58.3	37	+	26	-	0	-	S
Test Average (n=71)	86		88		58.3	36		27		1		
L.S.D. (0.05)	6		9		5.9	1		1		1		
C.V.	7		7		7.3	3		4		68		

* A plus or minus sign indicates a performance significantly above or below the test average.

♦ The 0-9 ratings indicate relative disease intensity where 0=none and 9=total plant infection.

** Wheat spindle streak virus ratings are R=resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible, and VS=very susceptible. Ratings performed in the 2000 harvest year by Dr. Erik Stromberg, Extension Plant Pathologist at VA Tech.

Table 4. Summary of performance of selected entries in the 2000-2001 Mason-Dixon Soft Red Winter Wheat Nursery in Blacksburg and Warsaw, Virginia. The number under each column heading indicates the number of locations upon which data are based.

Line	Overall Yield (bu/a)	Overall Rank[1]	Overall Test Weight (lbs/bu)	Blacksburg Yield (bu/a)	Blacksburg Rank	Blacksburg Test Weight (lbs/bu)	Warsaw Yield (bu/a)	Warsaw Rank	Warsaw Test Weight (lbs/bu)	Heading Date (Julian)	Early Plant Height (in.)[2]
	2	2	2	1	1	1	1	1	1	2	1
COKER 9663	69.3	56	56.4	76.9	43	56.9	61.8	61	55.8	126	13
AGRIPRO FOSTER	64.3	81	55.7	64.6	89	55.7	64.0	55	55.7	127	14
PIONEER 2580	69.5	55	54.8	72.5	72	54.5	66.5	43	55.0	125	11
ROANE	70.2	51	58.2	85.3	11	58.3	55.1	87	58.1	126	11
VA98W-591	84.1	3	57.5	87.0	8	57.9	81.2	8	57.1	125	12
VA98W-593	78.4	18	58.4	87.2	6	59.0	69.6	26	57.8	124	12
Grand Mean (n=98)	70.7		56.0	76.0		56.1	65.5		55.9	125	13
LSD (0.05)	5.3		1.0	7.4		0.9	7.6		1.9	1	1

Line	Plant Height (in.)	Powdery Mildew (0-9)[3]	Lodging on 5/15 (0 9)	Lodging Prior to Harvest (0.2-10)[4]
	2	2	1	2
COKER 9663	34	6	1	5.1
AGRIPRO FOSTER	30	6	0	2.9
PIONEER 2580	28	2	2	4.3
ROANE	28	4	0	3.6
VA98W-591	28	1	0	3.8
VA98W-593	28	0	1	3.8
Grand Mean (n=98)	29	3	1	3.8
LSD (0.05)	1	1	2	1.0

[1] Rank according to yield.

[2] Early plant height serves as an indicator of spring growth habit.

Table 5. Summary of performance of selected entries in the 2000-2001 Mason-Dixon Soft Red Winter Wheat Nursery in Kentucky, Maryland, North Carolina, Tennessee, and Virginia.

Line	Kentucky Yield (bu/a)	Kentucky Rank[1]	Maryland Yield (bu/a)	Maryland Rank	North Carolina Yield (bu/a)	North Carolina Rank	Tennessee Yield (bu/a)	Tennessee Rank	Virginia Yield (bu/a)	Virginia Rank	Overall Yield (bu/a)	Overall Rank
COKER 9663	82.0	85	80.3	40	83.2	11	67.3	72	69.3	56	65.6	54
AGRIPRO FOSTER	110.7	1	77.6	61	81.1	18	63.3	79	64.3	81	61.8	37
PIONEER 2580	94.8	38	69.6	94	73.0	45	84.6	10	69.5	55	64.3	46
ROANE	96.4	31	85.6	11	80.4	19	77.6	30	70.2	51	55.7	20
VA98W-591	80.9	87	76.5	72	87.5	7	90.6	1	84.1	3	65.2	10
VA98W-593	101.5	11	88.5	7	82.9	12	86.6	6	78.4	18	52.7	1
Grand Mean (n=98)	91.4		79.5		69.2		72.6		70.7		76.7	

[1] Rank according to yield.

Table 6. Summary of performance of selected entries in the 1999-2000 Mason-Dixon Soft Red Winter Wheat Test in Blacksburg and Warsaw, Virginia. The number below each column heading indicates the number of locations upon which data are based.

Line	Overall Yield (bu/A)	Overall Rank According to Yield	Overall Test Weight (lbs/bu)	Blacksburg Yield (bu/A)	Blacksburg Rank According to Yield	Blacksburg Test Weight (lbs/bu)	Warsaw Yield (bu/A)	Warsaw Rank According to Yield	Warsaw Test Weight (lbs/bu)	Heading Date (Julian)	Plant Height (in)
	2	2	2	1	1	1	1	1	1	2	2
Coker 9663	81.7	37	59.5	81.2	38	59.0	82.2	36	60.0	121	39
Agripro Foster	72.5	74	59.1	72.5	66	59.1*	72.4	78	59.1	125	37
Pioneer 2580	86.1	16	57.8	87.9	14	58.3	84.3	22	57.3	120	37
Roane	85.4	20	60.5	97.1	1	60.9*	73.6	75	60.1	124	34
VA97W-469	85.6	19.0	58.9	82.8	29	59.5	88.5	14	58.2	31	36
VA98W-591	86.2	17	61.1	77.9	12	61.3*	94.5	25	60.9	122	33
VA98W-593	88.8	4	61.5	82.2	11	62.2	95.3	9	60.8	122	34
Test Mean (n=88)	79.7		58.5	78.4		58.8	80.9		58.2	122	35
LSD (0.05)	6.7		0.8	6.6		0.8	6.9		0.7	3	1

Line	Lodging (0.2-10)[1]	Powdery Mildew (0-9)[2]	Leaf Rust (0-9)	BYDV (0-9)	Plant Height on 3/24/00 (in)[3]	Juvenile Plant Growth Habit (0-5)[4]
	2	2	1	2	1	1
Coker 9663	2.6	6	0	2	15	1
Agripro Foster	0.9	6	6	3	13	1
Pioneer 2580	0.8	3	5	2	11	1
Roane	0.7	2	5	2	9	0
VA97W-469	1.6	0	6	2	11	1
VA98W-591	0.3	0	0	2	9	0
VA98W-593	1.4	0	2	2	9	0
Test Mean (n=88)	1.2	3	4	2	12	1
LSD (0.05)	1.0	1	2	2	1	0

Table 7. Summary of performance of selected entries in the 1999-2000 Mason-Dixon Soft Red Winter Wheat Test in Kentucky, Marlyand, North Carolina, Tennessee, and Virginia.

Line	Kentucky Yield (bu/a)	Kentucky Rank[1]	Maryland Yield (bu/a)	Maryland Rank	North Carolina Yield (bu/a)	North Carolina Rank	Tennessee Yield (bu/a)	Tennessee Rank	Virginia Yield (bu/a)	Virginia Rank	Overall Yield (bu/a)	Overall Rank
Coker 9663	72.1	52	66.7	44	65	23	89.2	2	81.7	37	75.0	20
Agripro Foster	74.7	39	60.4	81	45	84	83.8	11	72.5	74	67.2	51
Pioneer 2580	78.5	21	73.4	17	61	33	81.7	17	86.1	16	76.2	16
Roane	79.7	17	78.0	5	67	16	87.0	6	85.4	20	79.5	9
VA97W-469	66.3	74	67.9	38	52	69	80.1	29	85.6	19.0	70.3	37
VA98W-591	88.8	4	74.9	13	81	2	78.2	36	86.2	17	81.9	3
VA98W-593	89.0	3	80.1	2	71	11	87.7	4	88.8	4	83.3	2
Test Mean (n=88)	73.2		67.9		57.0		76.4		79.7		71.3	

[1] Rank according to yield.

Table 8. Summary of performance of selected entries in the 1998-99 Mason-Dixon Soft Red Winter Wheat Test in Blacksburg and Warsaw, Virginia. The number below each column heading indicates the number of locations upon which data are based.

Line	Overall Yield (bu/a)	Overall Rank According to Yield	Overall Test Weight (lbs/bu)	Blacksburg Yield (bu/a)	Blacksburg Rank According to Yield	Blacksburg Test Weight (lbs/bu)	Warsaw Yield (bu/a)	Warsaw Rank According to Yield	Warsaw Test Weight (lbs/bu)	Heading Date (Julian)	Height (in.)	Lodging (0-9)[1]
	2	2	2	1	1	1	1	1	1	2	2	2
COKER 9663	82	36	60.8	97	18	62.1	66	55	59.5	123	40	0.5
FOSTER	78	48	59.8	91	37	61.3	65	58	58.2	127	37	0.2
PIONEER 2580	87	19	59.2	99	12	60.8	75	26	57.6	123	36	0.2
ROANE	89	13	62.3	103	8	63.9	75	24	60.7	128	35	0.3
VA98W-591	90	10	62.8	95	27	64.1	84	8	61.4	125	33	0.2
VA98W-593	87	18	62.9	92	36	64	82	11	61.8	124	34	0.2
Test Mean (n=84)	80		60.0	90		61.5	70		58.6	124	36	0.5
LSD (0.05)	7		0.6	7		0.5	11		1.1	1	1	0.4

Line	Winter Kill (0-9)[2]	Powdery Mildew (0-9)	Leaf Rust (0-9)	Septoria (0-9)	BYDV (0-9)
	1	2	1	1	2
COKER 9663	3	1	0	2	1
FOSTER	2	2	3	3	3
PIONEER 2580	3	0	2	2	2
ROANE	0	0	1	1	2
VA98W-591	1	0	0	1	1
VA98W-593	0	0	0	1	1
Test Mean (n=84)	2	1	1	2	2
LSD (0.05)	1	1	2	2	1

[1] Belgian Lodging Scale=area x intensity x 0.2. Area is rated on a scale from 1 (plot unaffected) to 10 (entire plot affected). Intensity

[2] All 0-9 ratings indicated relative disease severity: 0 = no disease present; 9 = total plant infection.

TABLE 9. GRAIN YIELDS OF VA98W-591 & VA98W-593 VERSUS CHECKS IN THE 2000-01 UNIFORM SOUTHERN SOFT RED WINTER WHEAT NURSERY

	BELLE MINA		BAY		DEWITT		KEISER		QUINCY		GRIFFIN		PLAINS		ABERDEEN		GREENSBURG		WINFIELD	
	AL		AR		AR		AR		FL		GA		GA		ID		IN		KS	
VARIETY	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK
VA98W-591	**57**	**14**	**76**	**5**	**61**	**13**	**69**	**1**	**83**	**1**	**83**	**6**	**101**	**30**	**80**	**39**	**95**	**14**	**69**	**8**
VA98W-593	**61**	**5**	**60**	**39**	**58**	**21**	**66**	**7**	**69**	**18**	**79**	**12**	**110**	**4**	**98**	**17**	**106**	**3**	**50**	**33**
COKER 9835	58	11	63	32	52	35	59	22	68	22	73	19	100	31	108	3	76	40	71	3
COKER 9663	55	21	68	18	57	23	64	10	59	33	76	16	106	10	99	16	97	12	66	16
MASON	57	16	65	28	57	24	58	24	66	25	66	32	98	35	100	13	88	23	59	28
AGS 2000	66	2	64	30	69	2	68	2	74	6	83	7	108	6	108	2	81	33	50	31
MEAN: N=43	55		67		57		59		66		71		102		93		90		59	
L.S.D. (0.05)			13.6		8.9		8.3		11.7		8.5		9.7		13.55				6.8	
C.V. (%)			10		7.7		8.7		10.91		7.4		5.9		10.56				6.7	

	HOPKINSVILLE		LOGAN CO.		BATON ROUGE		QUEENSTOWN		PORTAGEVILLE		CLEVELAND		WOOSTER		CLEMSON		FLORENCE		KNOXVILLE	
	KY		KY		LA		MD		MO		MS		OH		SC		SC		TN	
VARIETY	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK		
VA98W-591	**88**	**8**	**92**	**10**	**91**	**2**	**93**	**10**	**57**	**7**	**79**	**7**	**83**	**7**	**59**	**27**	**75**	**9**	**81**	**1**
VA98W-593			**95**	**8**	**79**	**18**	**95**	**4**	**51**	**22**	**75**	**16**	**75**	**26**	**53**	**38**	**83**	**1**	**80**	**3**
COKER 9835	72	36	90	12	88	5	97	3	52	20	70	23	70	35	65	16	68	17	61	21
COKER 9663			77	37	85	11	93	8	53	18	73	19	83	6	53	39	53	33	58	26
MASON	81	23	81	33	70	33	92	11	52	21	69	24	84	4	67	9	63	23	71	9
AGS 2000	93	3	69	41	71	32	86	25	57	6	87	1	77	23	58	29	79	5	66	14
MEAN: N=43	82		86		77		87		51		71		76		61		63		62	
L.S.D. (0.05)	9.8		16.7				9.1		10.2		9		6.5		9.7		8.8		10.7	
C.V. (%)	5.9		11.6				6.5		12.3		6.4		5.3		9.9		8.8		10.6	

	OVERTON		PROSPER		BLACKSBURG		WARSAW		ENTRY MEANS		ENTRY MEANS		ENTRY MEANS	
	TX		TX		VA		VA		ALL LOCS		IN-REGION		CV < 10%	
VARIETY	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK
VA98W-591	**66**	**17**	**54**	**2**	**82**	**9**	**79**	**1**	**77**	**1**	**76**	**1**	**77**	**2**
VA98W-593	**69**	**9**	**49**	**8**	**77**	**14**	**76**	**3**	**74**	**5**	**73**	**6**	**72**	**10**
COKER 9835	64	21	47	11	79	10	55	26	71	15	69	13	71	17
COKER 9663	68	11	38	32	97	1	55	27	71	14	68	21	71	21
MASON	58	36	41	25	68	24	54	30	69	25	67	27	69	28
AGS 2000	76	2	56	1	71	19	61	15	74	7	73	4	77	1
MEAN: N=43	64		42		72		58							
L.S.D. (0.05)	7.1		7.7				8.5							
C.V. (%)	8.2		18				10.8							

TABLE 10. MEAN PERFORMANCE OF VA98W-591 AND VA98W-593 IN THE 1999-2001 UNIFORM SOUTHERN SOFT RED WINTER WHEAT NURSERY: AGRONOMIC AND DISEASE RESISTANCE CHARACTERISTICS

	WARSAW		MEAN YIELD		MEAN TEST WT		MEAN HEAD DATE		MEAN PLANT HT.		MEAN LODGING
	VA		ALL LOCS		ALL LOCS		ALL LOCS		ALL LOCS		15 LOCS
VARIETY	BU/AC	RANK	BU/AC	RANK	LBS/BU	RANK	JULIAN	RANK	INCHES	RANK	0-9
VA98W-591	79	1	77	1	59.1	6	115	27	31	40	1.7
VA98W-593	76	3	74	5	60	1	115	29	31	37	1.4
COKER 9835	55	26	71	15	56.6	33	116	35	31	39	0.8
COKER 9663	55	27	71	14	58.3	12	115	25	36	3	2.2
MASON	54	30	69	25	56.6	34	113	5	35	11	1.4
AGS 2000	61	15	74	7	58.5	8	114	14	34	21	1.4

	LEAF RUST													
	POWDERY MILDEW	FAYETTE-VILLE	KIBLER	BELLE MINA	PLAINS	BEEVILLE	ST.PAUL	STEM RUST	STRIPE RUST	HESSIAN FLY	SBMV	WSSV	Septoria tritici	GLUME BLOTCH
	6 LOCS	AR	AR	AL	GA	TX	MN	MN	2 LOCS	TX	KS	2 LOCS	8 LOCS	2 LOCS
VARIETY	0-9	%	%	0-9	0-9	IT	IT	IT	0-9	0-5	0-9	0-9	0-9	0-9
VA98W-591	0.6	11	62	0	1	R	TR	5MR-MS	0.6	1.3	1	2.4	2.7	2.3
VA98W-593	0.4	50	50	0	4	MR	TR	5R-MR	2	2	7	2.7	2.9	2.5
COKER 9835	3.3	70	5	4	9	R	TR	TR	3.5	1	2	2.8	2.9	1.3
COKER 9663	3.4	23	1	0	8	R	TR	TR	1.7	2.3	6	3	2.6	1.3
MASON	3.3	23	4	0	4	R	TMS-S	30MS-S	0.7	1.7	7	2.9	3.2	2.8
AGS 2000	1.3	5	0	0	0	MR	TR	10MR-MS	2.7	1	9	5.6	3.5	1.5

TABLE 11. MILLING AND BAKING QUALITY OF VA98W-591 AND VA98W-593 IN 2000-01 UNIFORM SOUTHERN SRW WHEAT NURSERY

REGION 1

VARIETY	MILL SCORE	BAKE SCORE	SOFT EQUIV.	FLOUR YIELD	FLOUR PROTEIN	GLUTEN STRENGTH	WATER ABSORB	COOKIE DIAM
VA98W-591	98.8 B	101.1 A	60.7	70.8	8.66	143.7	57.2	17.85
VA98W-593	95.8 B	86.0 D	55.9**	70.6	8.77	146.5	59.7**	17.58
COKER 9835	104.8 A	98.9 B	64.6	71.8	8.33	107	59.4	17.98
COKER 9663	95.2 B	95.4 B	54.3**	70.9	8.63	138.6	57.2	17.82
MASON=STD	100 A	100 A	62.7	70.9	8.99	135.2	56.4	17.56
AGS 2000	104.5 A	103.6 A	61.1	72.9	8.98	125.4	55	17.68

REGION 2

	MILL SCORE	BAKE SCORE	SOFT EQUIV.	FLOUR YIELD	FLOUR PROTEIN	GLUTEN STRENGTH	WATER ABSORB	COOKIE DIAM
VA98W-591	98.4 B	93.4 C	55.4*	71.3	9.4	133	57.3*	18.03
VA98W-593	93.3 C	71.1 F	50.9**	70.6	9.98	140.7	59.4**	17.44*
COKER 9835	103.2 A	95.3 B	59.2	72.1	9.14	112.3	58.6**	18.37
COKER 9663	92.4 C	82.0 E	49.4**	70.8	8.86	125.9	56.4	17.65
MASON=STD	100.0 A	100.1 A	59.3	71.4	9.6	130.9	55	17.88
AGS 2000	103.1 A	97.8 B	54.3*	73.4	9.3	112.6	55.9	18.35

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TABLE 12. GRAIN YIELDS OF VA98W-591 AND VA98W-593 VERSUS CHECKS IN THE 2000-01 UNIFORM EASTERN SOFT RED WINTER WHEAT NURSERY

	BAY		KEISER		NEWARK		QUINCY		GRIFFIN		ABERDEEN		URBANA		GREENSBURG		W. LAFAYETTE		WOODBURN	
	AR		AR		DE		FL		GA		ID		IL		IN		IN		IN	
VARIETY	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK
VA98W-591	71	28	65	7	80	11	81	2	75	5	77	35	89	30	103	8	106	7	69	19
VA98W-593	67	32	65	6	76	21	77	9	69	9	77	37	89	28	96	25	104	17	68	21
CALDWELL	63	41	51	38	84	9	37	42	33	41	92	15	84	39	79	44	98	35	55	44
FOSTER	76	11	56	27	79	12	61	35	52	29	82	32	93	15	83	42	90	44	59	40
PATTON	74	16	62	11	83	7	70	24	62	17	89	19	99	1	109	3	103	19	66	25
ROANE	66	35	56	26	87	2	64	32	71	8	86	24	90	24	93	32	98	37	66	28
MEAN: N=44	71		58		75		67		57		87		90		97		102		67	
L.S.D. (0.05)	14.5		11.3				14.7				21.45		5.56		6.98		9.1		6.3	
C.V. (%)	12.5		12				10.9				17.87		4.55		5.24		6.4		8.1	

	WICHITA		WINFIELD		LOGAN CO.		CLARKSVILLE		COLUMBIA		LINCOLN		ITACA		SMITHVILLE		WOOSTER		NAIRN	
	KS		KS		KY		MD		MO		NE		NY		OH		OH		ON	
VARIETY	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK
VA98W-591	49	22	70	17	100	7	82	8	68	35	54	34	63	8	81	7	82	22	92	8
VA98W-593	37	40	55	38	109	2	78	20	78	14	61	28	55	17	66	32	79	28	92	9
CALDWELL	46	32	64	28	79	41	82	5	77	17	52	25	62	39	67	44	63	40	94	44
FOSTER	45	34	58	35	98	10	78	17	61	41	42	37	55	20	64	36	71	42	79	33
PATTON	48	26	60	34	84	31	82	4	79	11	68	19	56	15	86	1	81	23	89	15
ROANE	46	31	71	14	90	21	87	1	84	4	49	35	62	10	67	31	97	1	88	17
MEAN: N=44	49		66		90		76		73		60		54		71		82		82	
L.S.D. (0.05)	9.9		4.8		17.9		11.6		17.7				11		17.7		6.1			
C.V. (%)	12.5		4.4		11.9		9.5		14.7				12.1		12.4		4.6		9.1	

	RIDGETOWN		KNOXVILLE		OVERTON		BLACKSBURG		WARSAW		ARLINGTON		MEAN		MEAN		MEAN			
	ON		TN		TX		VA		VA		WI		ALL LOCS		IN-REGION		CV < 10%			
VARIETY	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK	BU/AC	RANK		
VA98W-591	104	26	79	2	58	19	89	4	90	1	71	8	79	1	83	2	86	4		
VA98W-593	109	14	71	12	57	21	89	3	86	3	68	18	76	11	81	10	83	13		
CALDWELL	94	44	57	43	43	26	64	41	43	44	63	34	65	44	69	43	73	44		
FOSTER	103	29	65	24	66	1	71	36	58	34	66	23	70	38	74	38	76	40		
PATTON	114	5	73	11	49	32	79	17	81	4	75	5	78	5	83	3	86	6		
ROANE	113	6	73	9	59	17	97	1	63	24	75	4	77	8	82	7	87	1		
MEAN: N=44	106		67		53.3		76		67		66		69		63					
L.S.D. (0.05)	6.2		10.8				9.5				9.1		6.4		8.1					
C.V. (%)	4.2		10				9.3				6.8		6.8		7.6					

2001-02

TABLE 13. MEAN PERFORMANCE OF VA98W-591 AND VA98W-593 IN THE 2000-01 UNIFORM EASTERN SOFT RED WINTER WHEAT NURSERY:

AGRONOMIC AND DISEASE RESISTANCE

	BLACKSBURG VA		MEAN ALL LOCS		MEAN TEST WT ALL LOCS		MEAN HEAD DATE ALL LOCS		MEAN PLANT HT. ALL LOCS		MEAN LODGING 12 LOCS	WINTER KILL 6 LOCS
VARIETY	BU/AC	RANK	BU/AC	RANK	LBS/BU	RANK	JULIAN	RANK	INCHES	RANK	0-9	0-9
VA98W-591	89	4	79	1	60.1	5	126	16	30	40	1.4	4
VA98W-593	89	3	76	11	60.9	1	126	11	30	41	2.1	3.9
CALDWELL	64	41	65	44	58.1	33	128	31	34	14	2.2	4
FOSTER	71	36	70	38	58.1	30	129	35	33	21	1.4	4
PATTON	79	17	78	5	58.3	26	126	10	33	20	2.4	4.4
ROANE	97	1	77	8	60.4	2	127	24	30	38	1.6	3.7

		LEAF RUST				STRIPE RUST							
VARIETY	POWDERY MILDEW 9 LOCS	FAYETTE-VILLE AR	KIBLER AR	LOGAN CO. KY	BLACKSBURG VA	AR	IN	NE	BYDV IL	SBMV 2 LOCS	WSSV AR	LEAF BLOTCH 8 LOCS	GLUME BLOTCH IN
	0-9	%	%	0-9	0-9	%	% FLAG	4-Jan	0-9	0-9	0-9	0-9	0-9
VA98W-591	0.7	15	33	0	0	1	0	1	5.5	1	4	2.5	2.5
VA98W-593	0.7	15	33	0	0	7	T	2	6.5	6.5	4.7	3	2.5
CALDWELL	3.4	11	4	5	0	11	T	4	7.5	2	5	4.4	2
FOSTER	3	19	4	2	4	50	25	4	8	1.5	4.7	3.1	3
PATTON	2.9	9	4	T	0	50	30	4	5.5	2	2.3	4.1	3
ROANE	1.2	4	4	T	0	9	T	4	8	3	4	3.2	2

	FUSARIUM HEAD BLIGHT				
	URBANA, IL				RIDGETOWN,ON
VARIETY	%INCIDENCE	%SEVERITY	INDEX	SEED QUALITY	
	%	%		0-9	0-9
VA98W-591	18.7	8.7	1.7	3.5	1.8
VA98W-593	15.3	18.7	2.7	4	1.2
CALDWELL	16.3	12.3	2.2	3	6
FOSTER	32	11	3.5	3.3	3
PATTON	13.3	9.7	1.3	4.3	3
ROANE	19.7	9.7	1.9	2	1.2

TABLE 14. MILLING AND BAKING QUALITY OF VA98W-591 AND VA98W-593 IN THE 2000-01 UNIFORM EASTERN SRW WHEAT NURSERY

VARIETY	MILL SCORE	BAKE SCORE	SOFT EQUIV.	FLOUR YIELD	FLOUR PROTEIN	GLUTEN STRENGTH	WATER ABSORB	COOKIE DIAM
VA98W-591	96.4 B	90.1 C	55.4	70.9*	8.52	117.2	61.03	17.74*
VA98W-593	91.6 C	82.1 E	51.4*	70.2**	8.26	120.6	63.50*	17.84*
CALDWELL	104.1 A	110.0 A	57.8	72.7	8.35	104.7	56.93	18.69
FOSTER	104.5 A	107.0 A	54.8	74.4	9.31	102.1	56.89	18.46
PATTON-STD	100 A	99.9 A	55.4	72	8.86	80.8	60.44	18.15
ROANE	91.6 C	78.4 F	55.7	69.6**	8.44	113.2	61.71	17.24**

Table 15. Entry means for 2001 Southern Uniform Winter Wheat Scab Nursery. "Rank" indicates a variety's standing among all 29 test entries. The number below each column heading indicates the number of tests (locations) upon which data are based.

Line/Variety	FHB Incidence (1-100)	RANK	FHB Severity (1-100)	RANK	FHB Index (1-100)	RANK	Scabby Seed (%)	RANK	Kernel Quality (0-9)	RANK	Seed Quality (0-2)[1]	RANK	Vomitoxin DON (ppm)	RANK	Greenhouse Type 2 (0-100)	RANK
No. of tests =>	**6**		**7**		**5**		**5**		**1**		**1**		**4**		**4**	
Ernie	32	1	13	1	7	1	18	2	1.3	1	1.3	3	6.6	7	25.7	2
Coker 9835	74	29	47	28	43	29	53	29	7	29	0.7	27	11.6	15	71.2	26
Coker 9474	40	3	19	4	10	2	16	1	1.3	2	1.7	2	3.3	2	31.4	3
VA98W-591	48	7	19	5	12	5	23	7	4.3	15	1.0	13	6.0	6	38.8	7
VA98W-593	45	5	26	16	15	11	21	4	3.7	9	1.3	4	4.3	3	48.7	14
Mean (N=29)	53		27		20		31		4.1		1.0		11		52.2	
LSD (0.05)	13.0		10		12.0		14.0		1.4		0.5		8.7		21.2	
C.V. (%)	23.9		27.3		51.5		34.1		20.7		27.3		62.4		28.8	

[1] 0=Poor, 1=Fair, and 2=Good quality.

Table 16. Entry means for 2001 Northern Uniform Winter Wheat Scab Nursery. Each entry was compared to the lowest (L) and highest (H) means in each column using $LDG_{(0.05)}$. "# Low Scores" is the number of disease traits for which an entry received a low score, "# High Scores" is the times it received a high score. Numbers below column headings indicate the number of tests (locations) upon which data are based.

Line/Variety	FHB Severity (%)	FHB Incidence (%)	FHB Index (%)	Kernel Rating (0-100)	Scabby Seed (%)	Vomitoxin DON (ppm)	FHB Severity in Greenhouse Tests (%)	# Low Scores	# High Scores
No. of tests=>	**9**	**8**	**8**	**4**	**3**	**3**	**5**		
Patterson	38.4 H	61.6 H	34.1 H	31.0 L	14.7 L	6.9 L	52.4	3	3
Freedom	21.4	62.8 H	21.8	50.1	17.5 L	12.6 L	30.5	2	1
P2545	39.8 H	71.4 H	40.7 H	66.5 H	26.8 H	16.2 L	55.8	1	5
Ernie	20.1 L	51.4	19.4	29.9 L	16.9 L	7.9 L	28.7	4	0
Roane	20.0 L	60.3 H	19.9	32.0 L	16.3 L	5.4 L	27.3	4	1
VA98W-591	20.4 L	56.4	16.6 L	34.5 L	9.7 L	7.4 L	47.1	5	0
VA98W-593	27.4	59.8 H	21.6	36.3 L	7.2 L	5.3 L	58.8	3	1
Mean (N=49)	24.6	57.5	22.6	42.0	18.4	11.9	46.3		
LSD (0.05)	9.3	15.0	10.5	17.1	15.0	14.2	18.9		

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued *(7 U.S.C. 2421)*. The information is held confidential until the certificate is issued *(7 U.S.C. 2426)*.

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Virginia Tech Intellectual Properties, Inc.	VA98W-591	McCormick
4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	**5. TELEPHONE** *(Include area code)*	**6. FAX** *(Include area code)*
1872 Pratt Drive, Suite 1625 Blacksburg, VA 24060	540-951-9374	540-951-5292
	7. PVPO NUMBER 200300115	

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain.** ☑ **YES** ☐ **NO**

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? **If no, give name of country.** ☑ **YES** ☐ **NO**

10. Is the applicant the original owner? ☐ **YES** ☑ **NO** **If no, please answer one of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?
☐ **YES** ☐ **NO** **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?
☑ **YES** ☐ **NO** **If no, give name of country**

11. Additional explanation on ownership *(If needed, use the reverse for extra space)*:

Original owner Virginia Polytechnic Institute and State University assigned its owernship to current owner Virginia Tech Intellectual Properties, Inc. (See attached)

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

200300115

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY (hereinafter referred to as the "UNIVERSITY"), assigns to VIRGINIA TECH INTELLECTUAL PROPERTIES, INC. (hereinafter referred to as "VTIP") all rights, title and interest in and to the GERMPLASMS listed below as held by the UNIVERSITY:

VTIP 02.047	Price/VA96-44-321 Barley
VTIP 02.048	VA98W-593 Wheat
VTIP 02.049	VA97W-469 Wheat
VTIP 02.050	McCormick/VA98W-591

The UNIVERSITY, by its authorized agents, agrees that it will execute all necessary assignments as requested by VTIP, to facilitate the filing of patent applications and/or copyright registrations. It will render any reasonable assistance requested to aid in preparation of such applications and/or registrations.

The UNIVERSITY shall retain the right to make use of the GERMPLASM for internal research and other non-commercial purposes without cost to the UNIVERSITY.

All royalties, rents, payments, or any cash receipts from the sale, assignment, transfer, licensing or use of the GERMPLASM shall be the property of VTIP and shall be distributed according to the provisions of the Virginia Agricultural Experiment Station (VAES) Plant Germplasm Release Policy (PGRP).

Prior to the execution of this Assignment, the UNIVERSITY has not granted the right of license to make, use, or sell said GERMPLASM to anyone except to VTIP, nor has it otherwise encumbered its rights, title and interest in said GERMPLASM, and it will not execute any instrument in conflict with this Assignment.

IN WITNESS WHEREOF, the UNIVERSITY has caused this Assignment to be signed this 18 day of April, 2002.

VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

BY _____
MINNIS E. RIDENOUR
Chief Operating Officer

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200300115

STATE OF VIRGINIA

COUNTY OF MONTGOMERY, to-wit:

The foregoing instrument was acknowledged before me this 18th day of April, 2002, by Minnis E. Ridenour, Chief Operating Officer of Virginia Polytechnic Institute and State University, on behalf of said University.

Notary Public

My commission expires: 12/31/04